Center Innovation Fund: JSC CIF

Human-Systems Integration (HSI) Methodology Development for NASA

Completed Technology Project (2011 - 2012)

Project Introduction

Human-Systems Integration (HSI) refers to design activities associated with ensuring that manpower, personnel, training, human factors engineering, safety, health and survivability are considered from the start and in each life cycle phase. This project will work with the development and demonstration of an effective methodology for HSI at JSC and validate it through a technology demonstration and evaluation in the integrated Power, Avionics and Software (iPAS) Flight Deck of the Future (FDotF) facility. An HSI design methodology serves as a means of ensuring communication with other disciplines, such as systems engineering (SE), and treats the human as a critical system element. Although SE has always called out HSI, in reality it is rarely addressed / invoked for anything other than the mission itself. By integrating HSI early on (pre-PDR) as well as throughout the NASA SE process, we can produce cost-effective products that optimally meet mission objectives while reducing operational era costs.

A technology with game-changing potential for crew to space system interaction will be selected to develop using the HSI Methodology created through the efforts of the HSI Methodology JSC IR&D FTE allocation, HSI WG (Working Group), and HSI ERG (Employee Resource Group). The integrated Power, Avionics and Software (iPAS) Flight Deck of the Future (F.F) Testbed core capability will be completed through this project and used for testing. Through iterative Human in the Loop (HITL) testing and demonstration of the technology, using the proposed HSI methodology, the team will validate the methodology. The F.F testbed, in JSC Building 29, Lab 233, will provide core testing systems, including partial space-system mockups, test consoles, and data collection systems. Collaboration with a variety of key disciplines will provide the expertise needed to plan and execute the HITL test.

Anticipated Benefits

Following the progress that has been made within the military, industry and academia are beginning to focus on the cost benefits of implementing HSI throughout their project lifecycle. However, NASA has traditionally addressed the human aspect of product development late in the development phase. The Multi-Purpose Crew Vehicle (MPCV) Program recognized the need for a more human-center design method for the design of the Orion vehicle and took steps in that direction by implementing the Cockpit Working Group at the program/project level.

Project Image Human-Systems Integration (HSI) Methodology Development for NASA

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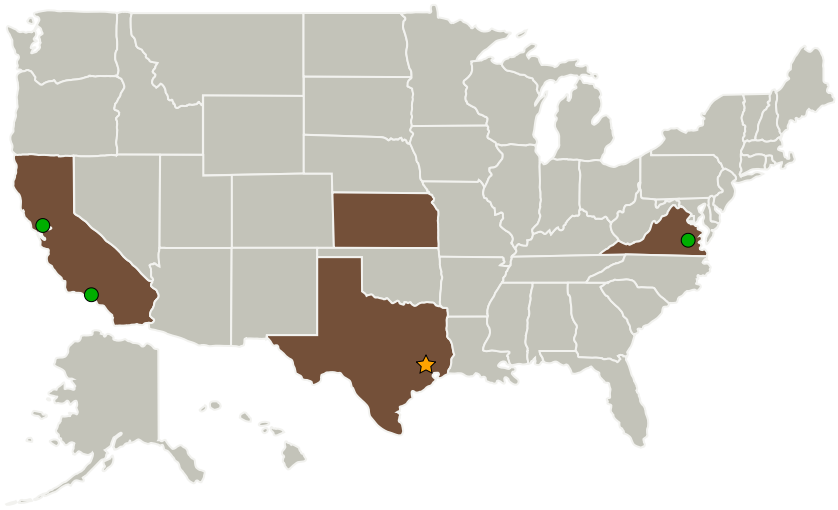
Primary U.S. Work Locations and Key Partners



Organizations Performing Work	Role	Type	Location
★Johnson Space Center(JSC)	Lead Organization	NASA Center	Houston, Texas
●Ames Research Center(ARC)	Supporting Organization	NASA Center	Moffett Field, California
●Jet Propulsion Laboratory(JPL)	Supporting Organization	NASA Center	Pasadena, California
●Langley Research Center(LaRC)	Supporting Organization	NASA Center	Hampton, Virginia

Primary U.S. Work Locations	
California	Kansas
Texas	Virginia

Organizational Responsibility

Responsible Mission Directorate:

Space Technology Mission Directorate (STMD)

Lead Center / Facility:

Johnson Space Center (JSC)

Responsible Program:

Center Innovation Fund: JSC CIF

Project Management

Program Director:

Michael R Lapointe

Program Manager:

Carlos H Westhelle

Project Manager:

Christie N Sauers

Principal Investigator:

Christie N Sauers

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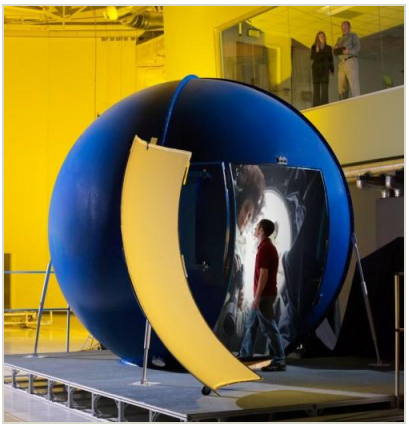
Images



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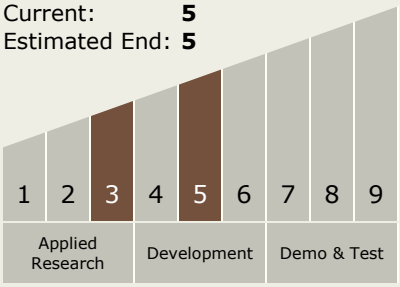
Project Image Human-Systems Integration (HSI) Methodology Development for NASA
(https://techport.nasa.gov/image/2326)

Technology Maturity (TRL)

Start: **3**
Current: **5**
Estimated End: **5**



Technology Areas

Primary:

- TX07 Exploration Destination Systems
  - TX07.2 Mission Infrastructure, Sustainability, and Supportability
    - TX07.2.1 Logistics Management